Clays and Carbonates in a Groundwater-fed 3.8 Ga Martian Lake: Insights to Subsurface Habitability on Mars

- ABSTRACT

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13:40 - 18:00

- *Moscone South*

- *- Poster Hall*

On Earth, the deep biosphere remains a largely unexplored, but clearly important carbon reservoir. Results from some uplifted central peaks in craters on Mars indicate that substantial carbon was also present at depth and might have helped sustain a deep biosphere. In fact, many factors relevant to deep biosphere habitability are more favorable on Mars than on Earth (e.g. porosity of the crust, geothermal gradient). Future exploration of Mars should include landing sites where materials have been exhumed from depth by meteor impact or basins where subsurface fluids have emerged, carrying clues to subsurface habitability.

One of the most astrobiologically interesting sites on Mars McLaughlin Crater, a 93 km-diameter impact crater that formed ~4 b.y. ago. On the floor of the crater is a stratigraphic section of subhorizontal, layered sedimentary rocks with strong spectroscopic evidence for Fe-rich clay minerals and Mg-rich carbonates, which we interpret as ancient lacustrine deposits. The fluids that formed these materials likely originated in the subsurface, based on the paucity of channels leading into the crater basin and the fact that this is one of the deepest basins on Mars – a good candidate to have experienced upwelling of subsurface fluids. Therefore, the deposits within McLaughlin crater provide insight into subsurface processes on Mars. In this presentation, we will discuss the habitability of the martian subsurface as well as the geology of McLaughlin Crater and the possibility to detect biomarkers at that site with a future landed mission.

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